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ABSTRACT

This self-instructional module provides information and reinforcement exercises on the construction and evaluation of behavioral objectives. An introductory section offers a rationale for the specification of behavioral objectives as a means of improving communication between the parties involved in the educational process. The module then presents information, questions, and answers to the questions focusing on the differences between behavioral and non-behavioral objectives in terms of specificity; clarity/ambiguity; and the inclusion of goals, objectives, and evaluative measures. The next sections of the module consider the focus of behavioral objectives on the terminal or final behavior of students, rather than on the instructional strategy, and emphasize the importance of justifying each condition imposed by the behavioral objective. Next, the use of criterion measures to evaluate goal attainment and the importance of establishing reasonable and defensible minimum acceptance levels is underscored. The final set of texts and exercises refutes the argument that behavioral objectives are limited to the lower-level cognitive skills. The cognitive levels of knowledge, comprehension, application, analysis, synthesis, and evaluation are explained and behavioral objectives for each level exemplified. In addition, information and encouragement are provided for the inclusion of behavioral objectives focusing on affective development. (HB)

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IN SUPPORT OF BEHAVIORAL OBJECTIVES

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IN SUPPORT OF BEHAVIORAL OBJECTIVES

A learning program is designed to bring about some sort of change in one or more students. A reading specialist designs a program to help Johnny differentiate among b, d, and p; a biology teacher specifies activities so that students will learn to focus a microscope and make observations of unknown specimens; students are required to study the Constitution of the United States because it is hoped that this will affect their behavior; and the federal government provides funds for a large reading program in a depressed area because possible benefits may accrue.

You identify an educational problem. You come up with a possible solution to the problem. You set about trying out your solution with one or more students, or at least in some educational setting. If your goals are ambiguous, how will anyone ever know if your attempt was successful?

For example, you might say: "I want to do the right thing for these kids." Great! Now, when your program is done you can look for all the positive effects you observe (ignoring any failures) and say: "That's what I was trying to do." That's called a "cop-out."

The use of behavioral objectives is designed to improve communications. If you identify and specify your objectives in behavioral language, three important things happen:

1. Everyone interprets what you are trying to accomplish in approximately the same manner The confusion described in the play in chapter one (1) is avoided.

2. Everyone has a chance to decide whether or not they agree with what you are trying to do if he can't understand what your efforts are. You open yourself up for constructive criticism, which seems like a perfectly reasonable thing for a professional to do.

3. The success or failure of various parts of your program will become quite obvious to all who would look. You would not need to depend on testimonials or the predictions of authorities. Since a behaviorally stated outcome is in terms of observable behavior, one needs only to see if the behavior occurs to determine if the program is successful.

Consider the other side of the coin. Suppose you specify your outcomes in very vague and ambiguous language.

1. Different outsiders will interpret your efforts in light of their own interpretation of the vague statement. Different people will be expecting you to be attempting to do a wide variety of things in the program.

2. No one will really know spedifically what it is you are trying to do. Thus, no one can really agree with you; and no one can really disagree with you. Whenever someone disagrees, you respond: "That's not what I was trying to do."

Since no one really knows what you were trying to accomplish, the results of the program can be used to support or negate you original objectives, depending upon how the user happened to interpret your original statements.

Behavioral objectives are a vehicle for improving communication. If progress is to be made, all parties: student, teacher, test writer, trustees and accrediting agencies must have a clear, common interpretation of educational goals. The goal of this module will be to show you how to construct a behavioral objective, and how to evaluate a behavioral objective constructed by others. A behavioral statement states the goals, tells how the attainment of the goal will be evaluated, and the conditions under which it will be evaluated. The behavioral statement does not speak to the instructional strategy which will be involved. View the behavioral objectives movement as a technique for improving communications rather than as a new educational philosophy.

A POSITIVE APPROACH TO BEHAVIORAL OBJECTIVES

A Module of Self Instruction

Think positively about behavioral objectives. In this module you should learn how to construct a behavioral objective, or how to evaluate one, which has been constructed by someone else. You will be in a much better position to separate the positive and negative sides of the behavioral objectives issue when you have learned the technical considerations governing their construction.

This module is designed to be self-instructional. To use the module effectively, you cannot be a passive receiver on information, as you are with so much that you read. Throughout the module you will be asked to respond to questions, and your responses will be an integral part of the instructional process. Don't just skip by them! Make an explicit, written response to each question before you sneak a peek at the answer which is given.

The first task, it seems, should be to contrast behavioral objectives with their nonbehavioral counterparts. Before this is done, however...not meaning to nag...but...

DO YOU HAVE A PENCIL AND PAPER IN FRONT OF YOU AND READY FOR RESPONSES TO THE QUESTIONS TO BE ASKED IN THIS CHAPTER??????

The key to behavioral objectives is specificity. A behavioral objective is specific. A nonbehavioral is not. Here is a behavioral objective:

> Given a 200-word news article chosen from the front page of the local newspaper, the student should be able to read the article out loud to his class.

Most teachers would interpret that objective in the same manner. That is, most teachers would choose 200-word articles and have each student go to the front of the class and read the article.

The first question for your poised pencil and paper:

> Translate the behavioral statement about the news article into a behavioral one. That is, translate it into a statement which is ambiguous and such that it would probably be interpreted in markedly different manners by different teachers.

After each of the questions a dividing line will appear. The line functions as an eye barrier. Try not to look past the line until you have made your response in writing to the question. Commit yourself to an answer before looking at the one given. You'll learn better if you do.

Here are some possibilities: "Students should learn to read newspapers." "Reading out loud is important." "Young kids need to be aware of current events." The behavioral objective which was given could have been spawned by any of these three general statements. Each of these three is nonbehavioral. Each is ambiguous and would be interpreted in highly variable manners.

Reviewing then, these two points have been made:

1. Behavioral objectives are specific. Nonbehavioral objectives are not specific.

2. A behavioral stated objective will be interpreted in nearly the same manner by all who use it. A nonbehavioral stated objective, being ambiguous, leads to highly variable interpretations.

Another important manner for distinguishing behavioral and nonbehavioral objectives is suggested:

Most people would evaluate a behaviorally stated objective in the same manner, whereas the evaluation of nonbehaviorally stated objective could vary widely.

Consider this objective:

Advanced arithmetic students should know about the metric system.

Teacher #1 sets out some objects, makes available a meter stick, a one liter container, and a balance beam using metric measures, and asks the student to make measurements in metric units. Teacher #1 interprets "know" to mean "use." The students "know' about metric units when they can use metric measuring devices to make measurements.

Think of two different ways that other teachers might evaluate the objective "fifth-grade students should know about the metric system." Teacher #1 interpreted the statement to mean "use with real objects." How would others evaluate to see if students "knew" about the metric system? Write down two other ways.

Many answers are possible. For example, you might have chosen: (a) Ask the student questions which require converting from one unit to another within the metric system. (b) Require the students to convert units of weight, length, and volume from metric to English units. (c) Conversely, ask the students questions which require converting units of weight, length, and volume from English to metric units. (d) Ask students to estimate the height, weight, and volume of various objects in metric units.

I do. I did. I have done. Doing-there's the key to stating something in behavioral terms. What will the learner be doing when he reaches the objective? If you and everyone else are in pretty close agreement on what the learner will be doing when the objective is attained, the objective is not specific enough.

Write the numbers 1 through 14 vertically on your paper so you can answer "yes" or "no" to each of the following questions. For each of the fourteen short statements below, answer "yes" if the statement tells quite clearly what some learner will be doing. Write "no" if you think the statemant does not communicate this information unambiguously.

1. grasp the significance of
2. list
3. gain insight into
4. appreciate
5. define
6. have a knowledge of
7. contrast
8. solve
9. identify
10. fully understand
11. construct
12. explain
13. know
14. compare

What is a learner doing when he is "grasping the significance of" some concept? Would one wait for the learner to smile, sigh, or say "ahah"? Would most teachers evaluate the act of "grasping the significance of the decimal system." The statement is clearly an ambiguous one. The first answer on your paper should be "no." Other "no" answers should be marked for numbers 3, 4, 6, 10 and 13.

The second verb is "list." The meaning is fairly clear. The learner will be making some sort of list. Of course, to be completely unambiguous one needs to state how the learner will be making the list (oral or written), what aids he will have in his work, and what we expect to see on the list. The difference between "list" and "grasping the significance of."

"Gain insight into," "appreciate," "have knowledge of," "fully understand," and "know" are in the same category as "gain insight into." Each suffers from a lack of c arity: a lack of commonly held meaning. Different teachers would teach toward them in varying manners. Different evaluators would measure their attainment with dissimilar instruments. Each verb fails to communicate without ambiguity what the learner will be doing when he reaches the objective.

On the other hand, "list," "define," "contrast," "solve," "identify," "construct," "explain" and "compare" do communicate; although each is somewhat ambiguous standing alone, since the content, method, and conditions have not been included. Each of the verbs has a relatively precise meaning and describes a fairly specific behavior on the part of the learner. Each tells what the learner will be doing when he reaches the objective.

Suppose you try the same sort of activity again. This time the question will be based on entire sentences rather than just verbs.

Write the numbers 1-6 on your page. Answer "yes" if you think the sentence communicates in a fairly unabiguous manner what a learner will be doing when he reaches the objective, and "no" otherwise. If you are in doubt, ask yourself, "Would many different teachers teach toward this objective in the same manner?" and "Would many different teachers evaluate the attainment of this objective in the same manner?"

1. The student will understand how the library catalog system works.

2. The students will acquire an appreciation of the contributions of minority cultures in America.

3. The learner will be able to explain orally how the combustion engine works.

4. The students will have a complete knowledge of the basic arithmetic skills.

5. The learner will be able to define in words what is meant by "manifest destiny."

6. The students will choose from a list of nineteenth-century Romantic composers and those on non-German nationality.

This time you should have no responses on the first, second and fourth sentences; and "yes" responses for the third, fifth and sixth. As any librarian will tell you, the library catalog system is very complex. One person's interpretation of "understanding the system" might simply be "the ability to locate a book, given a call number." Another teacher might ask for the recall of the category names associated with each number in the system. Hundreds of other interpretations are possible. The objective fails to communicate unambiguously. No general agreement would exist regarding evaluation of the goals.

Now you will further refine your skill in identifying goals and objectives. Answer each of the following questions a) Does the statement include a complete objective, b) Does it contain a statement of a goal only; or c) does it contain a statement of evaluation only?

1. A freshman geometry student should be able to correctly write at least 30 out of 35 proofs on the final test provided by the textbook publisher.

2. To improve penmanship skills of Iranian students.

3. The students should acquire in MAI appraisal course a knowledge of fundamental valuation principles so that 90 percent of the students pass the written state qualifying test for candidacy in the American Institute of Real Estate appraisers.

4. To develop in students the ability to read longitude and latitude on an atlas or globe.

5. In a men's swimming class: To develop breast stroke performance so that 85 percent of the students can swim the length of the pool in less than 3 minutes.

6. To develop in college-level English students the skill of diagramming sentences so that at least 75 percent of them responding to a teacher-made written test can correctly diagram 12 out of 15 sentences.

7. To provide exposure to basic office tasks and development of these tasks in a secretarial procedures/business class.

8. To improve a capella singing in choral classes.

The list above contains four complete objectives, four statements of goal only, and no statements of evaluation only. The complete statements are numbers one, three, five, and six; and the goal-only statements are the remaining four. If you are having any trouble at this point, go back and read through the eight statements again. Try to compare the four which are statements of goals only to the four which are complete.

At this point, you should be getting a fairly clear picture of the distinction between behavioral objectives and those not stated in behavioral terms. The next task is to refine your objective writing abilities with a few technical suggestions.

To start off, why don't you write down your definition of behavior. What is a behavior? A goldplated psychological definition is not required. Just give your definition, in your own words.

Do you know what the word "perceive" means? It means "to have knowledge of through any of the senses." One good working definition of a behavior uses the word perceive: A behavior is any perceivable activity engaged in by the person you are observing. So if the person you are observing is doing something, and you are able to have knowledge of it through one of your senses, whatever it is he is doing is called a behavior.

Next, consider the notion of terminal behavior. To terminate some act means to end it; thus terminal behavior implies the ending behavior. When a behavioral objective is used in the sense of a contract or of a prediction, the terminal behavior is that performance expected of the learner at the end of the period of instruction. It's the behavior you expect him to show you. Two points regarding the concept of terminal behavior should be made.

First, as mentioned earlier, the objective states the terminal behavior expected, but not the method whereby the teacher reaches that behavior. Your curriculum guide or the teachers' edition of the textbook might suggest instructional strategies, but the behaviorally stated objective usually speaks only to the goal and the evaluation standards.

Second, the learning of a particular concept can involve a whole series of sequential or hierarchical terminal behaviors. Later, a more complicated example from a social studies course will be given, but for now, consider this example from basic mathematics:

> The student shall be able to multiply (using only pencil and paper) any five-digit number (including up to three decimal positions) by any four-digit number (including up to two decimal positions). The student shall be able to complete at least 80 percent of such problems without error.

This is a complex objective. A whole series of bridges need to be crossed by the student before he can possibly reach the terminal behavior expressed. To start with, he needs to recall the arithmetic "facts" - 6 x 4 and 7 x 9, and so forth. Even before that, though, he needs to recognize that the numeral "3" symbolizes a grouping of three objects, and the meaning of the other numerals.

> Write down a prior behavioral objective- one which probably would need to be accomplished before the student moves on to the multiplication of five- and four- digit numbers, both of which may involve a decimal. Try to write this prior objective in behavioral terms.

You might have changed the number of digits in one of the numbers. For example, perhaps you altered the "five" and/or the "four" to some smaller value. You might have decided that multiplication of numbers like this without decimal points is a necessary precondition for multiplying with decimal points is a necessary precondition for multiplying with decimal values. Maybe you started back with two one-digit numbers which involved decimals. Check your objective for its "behavioralness." Would most teachers interpret in the same manner? Would the evaluation efforts of most teachers be similar? Does it have a statement of a goal and a statement of the evaluation of that goal? Does it tell what the student will be doing when he reaches the objective?

The topic is terminal behavior, but do not interpret this to mean that every learning sequence has only a singly behaviorally stated terminal behavior, or that the behavioral statement will catalog each and every prior step. The objective regarding multiplication of five- and four-digit numbers involving decimals could (and probably should) be dissected much further into the series of sequential and hierarchical tasks which lead to the final terminal behavior. (The work of sequencing tasks is known as "task analysis." With that procedure we may want to work later).

Behavior has been defined. You now should recognize the meaning of terminal behavior and that a learning sequence may include a whole series of terminal behaviors. The next technical issue is that of the statement of conditions under which the behavior is to be manifested. Consider this objective:

> Given raw data, the student shall be able to compute the value of a product-moment correlation coefficient.

Suppose you were a student in the class and the instructor just announced the objective written above. Do any questions come to your mind about the conditions under which you will be expected to compute this correlation coefficient?

> Try to write one question regarding conditions on your paper.

Now if you have never been introduced to a correlation coefficient the task was probably difficult. But if you have had even a minor amount of statistical training, your first question was probably, "Will the formula be provided?" The formula is a fairly long and complicated one. Actually, the "Given raw data" was a condition already in the original statement. The instructor may now change the objective to read:

> Given raw data and the computing formula, the student shall be able to.....

Other questions come to mind. The formula requires the computation of square roots. "Will we have a square root table available?" The computations are tedious. "How many will be expected to be completed in an hour?" Everyone makes mistakes, especially when doing computations by hand. "Are we expected to get all questions correct?" "Will we have an adding machine, desk calculator, or computer to work with?"

Of course, you can get carried away with these statements of conditions. "Given a standard school desk in a classroom of 32' by 40' between 11:15 and 11:45 A.M. on a Tuesday with the room temperature not deviating by more than 4 from 74 F., the student shall be able to...." State only those conditions which impinge in an obvious way on the manner in which the learner will show you whether or not he has reached the objective. Here are some examples of what is meant by "impinge in an obvious manner":

Given the use of mathematical tables...
Using Chapter 6 of your book as a guide...
Given a list of 10 irregular verbs...
Without the use of a dictionary...
Without the use of notes...
Using only the given chart...

> Look at the objective below. List on your paper the part or parts of the objective which are statements of conditions.
>
> Given a list of the fifty states, the student should be able to list the names of at least one of each state's two U.S. senators, without the use of books or references.

"...the student should be able to list the name..." is the statement of the goal. The part "of at least one of each state's two U.S. senators, ..." and "without the use of books or references..." are both statements of conditions.

Tossing a condition or two into each behavioral objective you write is not tough at all. If you ordered a steak at a restaurant, the chef will probably toss a nice piece of fresh green parsley on the plate before it is served to you. The conditions are not like the parsley. The parsley is not an integral part of the meal (except for those aesthetically sensitive); but the conditions are an integral part of the objective. They

must be reasonable. You must be prepared to defend the conditions which you impose as being harmonious with the overall goals of the instructional program. The conditions will be closely related to the instructional strategy used to reach the objective. The objective, you recall, gives only the goal and the type of evaluation which will be used. No mention of the instructional strategy will be made directly in the objective. But the instructional strategy and the overall goals of the instructional program must be kept in mind when imposing the conditions.

Why, for example, should the student recall the name of even one of the senators from each state. How does having this information immediately available in memory further the instructional program? Why not have them match the names of senators with the names of the 50 states? For that matter, why not have them recall the names of the 50 states as well!

The example is too superficial. Consider this objective from an educational psychology course for sophomores:

Without the use of notes or books, the student shall recall the definitions of and give an example of the following terms: reinforcer, punisher, extinction, reinforcement, punishment, time out.

"Why must I recall these? I'll just forget them soon!" A logical student question and one which is deserving of an honest reply. How does having the student recall these definitions for use as needed in the future? Perhaps the student could be encouraged to keep his textbook at the completion of the course for use later when a definition is required.

The instructor who established the recall condition on the objective should be prepared to justify it. Such justification might hinge one of these thoughts: The objective is a means to an important end; it is an important end; or it is both.

Assuming that the course in question has a marked "behaviorist" flavor, it can be assumed that these terms will occur frequently in lectures, discussions, and questions. The instructor might reason that the student must have the definitions immediately in memory as a means to an end. That is, the ability to instantly recall the definitions will be a necessary condition if the student is to take a meaningful part in the lectures and discussions, and ask meaningful questions. Another instructor might argue that knowledge of the definitions of these terms (in a recall format) is an important end in and of itself.

The student has every right to know the conditions under which his performance will be evaluated. And this information should be known in advance of the actual evaluation. This need is shared by students at all levels-from kindergarten to graduate school. If the students know the conditions in advance, they will be able to challenge the instructors to justify the conditions which are imposed. "Why must this be memorized? "Why can't I just

use a slide rule?" "Why can't I write my report instead of presenting it orally?" In short, the conditions must not be capricious. They must be reasonable in the face of the instructional strategies and overall objectives of the program. Before the next topic is introduced, a brief review seems appropriate.

Answer these on your paper:

1. For each of the following, write down the part of the statement which describes the conditions.
   a. The student will write a 200-word essay on a topic provided by the teacher.
   b. The student will be able to solve the following type of problem:

      $2x + 3y = 17$
      $x - 4y = -6$

   c. Using only his tool kit and general instruction manual, the learner will be able to adjust and measure the spark plug gap on any car.
   d. The students will be able to name all the bones of the leg and foot with 90 percent accuracy.
2. When a teacher imposes a condition of performance on an objective he should be able to justify that condition in at least one of two ways. What are the two ways?
3. "The learning of one concept may include a series of terminal behaviors." Explain what this means.

Question 1-a has a pretty obvious condition imposed. The condition is "on a topic provided by the teacher." If the student provides the topic, the condition is changed in a marked manner. The second and fourth parts (1-b and 1-d) have no statement of condition included. What you might have taken for a condition in 1-d ("with 90 percent accuracy") will soon be introduced as a minimum acceptance level. The condition in 1-c is the first phrase up to the word "manual." For the second question, the teacher should be able to justify the condition either as a means to an end or as an important end in itself. Finally, a complex learning task may require the specification of a whole series of sequential behavioral objectives, all of which would include a terminal behavior.

The behavior....The terminal behavior....The conditions under which the terminal behavior will be manifested. The task is to learn how to construct

behavioral objectives; and the goal part has now been covered. The next task is the evaluation part of the objective, and here the terms criterion measure (sometimes just shorthanded "criterion") and minimum acceptance level become the focus of attention.

The "behavioralness" of a behavioral objective maybe checked by answering the question, "Would most teachers evaluate the attainment of the objective in approximately the same manner?" The goal and conditions parts of the behavioral objective need to be stated in specific and unambiguous language. The manner in which the attainment of the objective will be evaluated must also be very specific.

By naming the criterion measure, you are identifying your instrumentation plan. An evaluation "instrument" could be a teacher-made test, a standardized test, an observation of the student performing some act, some sort of oral statement. In short, the student behavior which can be legitimately viewed as indicating the attainment of the objective's goal. Some examples of critierion measure statements in a behavioral objective:

> "on a test constructed by the teacher," "on the XYZ standard mathematics achievement test," "by taking ten minutes of dictation in shorthand and transcribing it to business letters," "by removing the sparkplugs, cleaning them, and replacing them in the car."

Each of the above simply identifies the measure to be used to determine the attainment of the objective. Each stops short of making reference to a value judgment. None communicate to the teacher how he will separate satisfactory performance from that which is unsatisfactory. For example, consider this objective: "After six weeks in physical education, the students should be able to run one mile on level ground." The goal is to "run one mile" and in this case the goal also describes the criterion measure-namely the act of running one mile. But this particular physical teacher has a small problem with the objective as it stands. Almost anyone can run a mile! Now some might run the mile in 528 separate 10-foot "wind sprints," each of which is separated by a 10-minute rest. Some may finish the mile in four minutes; others may require four days-but nearly everyone can run a mile. One wonders if this what the physical education teacher had in mind.

The teacher probably was interested in getting the students into good physical condition, and would therefore be concerned that they could run the mile within some commonly accepted time standard. He might complete the objective with a final phrase: "within eight minutes." The "run a mile" is the criterion measure; the "within eight minutes" is the minimum acceptance level.

Suppose a minimum acceptance level is now linked to the examples given earlier. In each case, the criterion measure is given in regular print, and the minimum acceptance level is shown in italics:

...by scoring <u>85 percent correct</u> on a test constructed by the teacher.

...by reaching at least the 50th percentile on the national norms of the XYZ standard mathematics achievement test.

...by presenting a five-minute extemporaneous talk to the class judged to be satisfactory by unanimous consent of three speech teachers.

...by taking ten minutes of dictation in shorthand and transcribing it to business letters within one hour and with less than three mistakes per page.

...by removing the sparkplugs, cleaning them, and replacing them in the car within one hour and so that the car runs when the task is complete.

Now you try some examples. For the first five questions, copy the criterion measure on one line, and the minimum acceptance level on the next.

1. ...by swimming two lengths of front crawl and two of back crawl within 15 minutes, stopping not more than twice.
2. ...by writing a paper comparing the plots of two novels by the same author to the satisfaction of the teacher.
3. ...by showing knowledge of traffic laws and signs in a 60-minute driving experience where two or less errors are made.
4. ...by sewing a piece of clothing requiring a 7-inch zipper such that an outside judge cannot distinguish student's zipper from an example prepared by the teacher.
5. ...by solving 12 addition problems in less than 15 minutes, making no more than two mistakes.

On the next five only the criterion measure has been given. You supply a minimum acceptance level which seems reasonable.

1. ...by leading a 30-minute discussion on a social problem...
2. ...by taking a spelling test of 20 words...
3. ...by typing a business letter...

The issue is important. For example, can you think of times when a student's performance in gym is measured by a cognitive test; a student's ability to use the microscope in biology is measured by asking him to match the names of the parts with letters marked on a picture of a microscope; the "improvement in the faculty's instructional capabilities" is measured by the age of the faculty or the highest degrees held by most?

The first cautionary note: Make sure the criterion measure you choose fits the goal.

Next, the minimum acceptance level should be both reasonable and defensible.

Choose the completion of each of the following three objectives which you think is most reasonable and defensible.

1. Without references, the student should be able to name the parts of a flower:
   a. within 40 seconds.
   b. naming correctly 18 out of 20 parts.
   c. naming all 20 parts without error.

2. The student should be able to type the letter provided by the teacher:
   a. without errors.
   b. with no more than three neatly corrected errors.
   c. to uniform darkness and deviating no more than 1/16 inch from the margins.

3. The advanced authentic should know the addition, subtraction, and multiplication facts for the numerals 1 through 10:
   a. with at least 85 percent correct.
   b. with less than 2 percent wrong.
   c. without error.

Unless the teacher had some strong and compelling reason to demand absolute mastery, it seems that response "b" is more reasonable and defensible than "c" in the first item. Establishing a time standard, as suggested by "a" seems completely out of harmony with the task at hand. In the second question, the "b" response seems most appropriate. Demanding errorless typing would fail most of us, and uniform darkness and the amount of deviance from margins are both really functions of the machine one uses, rather than functions of the

typist. Both are unreasonable and nondefensible.

The last question deserves some comment. The topic is the number facts from 1 to 10 for addition, subtraction, and multiplication. A frequently used minimum acceptance level is the 85 percent mastery mentioned in the "a" response to the item. In the caution currently under discussion, you have been asked to make the minimum acceptance level reasonable and defensible. Is it reasonable to ask 85 percent mastery of these facts? Is it reasonable to ask 98 percent mastery, as suggested by "b"? Or should you demand absolute mastery-100 percent correct?

These are arithmetic students, remember. So much of what they do in arithmetic and later will depend on these facts. Adding columns of numbers, subtraction, multiplication of numbers greater than one digit, long division, computing interest, or doing "story problems" all depend on knowledge of the number facts. The 100 percent mastery specification seems both reasonable and defensible in this case.

Thus the second cautionary note: The minimum acceptance level must be both reasonable and defensible. A corollary to this: Make the degree of mastery fit the importance of the task. Don"t fix your mind on one percentage figure and refuse to deviate from it.

Assuming your problems with the presentation have been minimal to this point, you are now promoted out of basic training and assigned the status of specialist in behavioral objectives it is time for you to review with some real patients.

Divide each of the following statements into four component parts, as follows:

a. Which part (if any) states the goal?
b. Which part (if any) states the condition(s)?
c. Which part (if any) describes the criterion measure?
d. Which part (if any) describes the minimum acceptance level?

1. Without books or notes the student shall demonstrate he has read Tom Sawyer by taking an in-class essay test and answering at least two out of four questions to the teacher's satisfaction.

2. The student shall show he has mastered division skills by solving ten division problems at the blackboard with nomore than one mistake.

3. The student shall show he knows how to use the library by locating five references without outside help and

locating correctly at least four of them.

4. Using any notes, the student shall demonstrate understanding of the Constitution by taking the required state objective test and scoring 70 percent or above correct.

5. The student shall show knowledge of the ten different types of triangles by correctly identifying at least nine when shown the shapes on the blackboard.

Here are the answers:

1. [conditions: Without books or notes] [goal: the student shall demonstrate he has read Tom Sawyer] [criterion measure: by taking an in-class essay test] [minimum acceptance level: and answering at least two out of four questions to the teacher's satisfaction.]

2. [goal: The student shall show he has mastered division skills] [CM: by solving ten division problems] [conditions: at the blackboard] [MAL: with no more than one mistake.]

3. [goal: The student shall show he knows how to use the library] [CM: by locating five references] [conditions: without outside help] [MAL: and locating correctly at least four of them.]

4. [conditions: Using any notes] [goal: the student shall demonstrate understanding of the Constitution] [CM: by taking the required state objective test] [MAL: and scoring 70 percent or above correct.]

5. [goal: The student shall show knowledge of the ten different types of triangles] [CM: by correctly identifying] [MAL: at least nine] [CM: when shown the shapes] [conditions: on the blackboard.]

Many critics of the behavioral objective movement contend that this technique will result in an emphasis on low levels of learning (recall, recognition, comprehension) at the expense of higher order things (application, analysis, synthesis). The response to this criticism is important enough to demand inclusion as a cautionary note at this point. Behavioral objectives can span

the entire range of cognitive, affective, and psychomotor objectives. While behavioral objectives at the recall and recognition levels are easiest to write, an example later will show how objectives can be written for all cognitive levels.

The problem might be more clearly understood if the notion of "cognitive levels" was made more explicit. Fortunately a classification system for these various levels has been developed. The system, or taxonomy, separates the cognitive area into six hierarchical levels. The levels are hierarchical in that each higher level depends on or subsumes the prior attainment of any level below it. Although you are directed to the primary source for a complete description, briefly the six levels, beginning at the lowest and moving to the highest, are as follows:

1. Knowledge. When you ask a student to indicate his knowledge, you are asking him to remember material which was learned previously. Objectives at the knowledge level can be recongized by the inclusion of verbs such as "recall," "recognize," "define," "match," "name," or "identify." In each case, the process involves a student first learning something, and then showing you, in some manner, that he has that knowledge.

2. Comprehension. Usually you will want more than just knowledge; you look for understanding as well. When a student comprehends an idea he should be able to do certain things with it. For example, he should be able to restate the idea in his own words; interpret it; or suggest how it will apply in a new or different situation. Objectives at the comprehension level can be recognized by the inclusion of phrases such as "give further examples of," "state in his own words," "explain," or "predict." Comprehension, then, is at the first level of understanding.

3. Application. A large proportion of the classroom learning program is directed toward developing in the student usable skills, techniques, and attitudes. The teachers hope the student will learn to apply what he has learned to his own life. Remember, though, that the levels of the taxonomy are hierarchical. A student cannot apply information until he comprehends it; and he cannot comprehend it until he knows it.

Application level objectives are fairly easy to recognize. Solving problems, computing answers, and demonstrating principles are just a few examples. The application level is an important one, for within it the student applies previously learned information to new situations which, it seems, is a primary overall objective in education.

4. Analysis. "Let's analyze this situation." You've heard that it means "take it apart." When you ask a student to analyze a problem, you expect him to break it into its component parts. Analyze a problem or situation. Break it down. Divide it up into its component parts...little pieces out of a big chunk. An analysis level objective demands that the student be able to take apart some problem, concept, or situation.

5. Synthesis. The opposite of "take apart"? Put it together-synthesize information from a wide variety of sources, and occasionally this information is contradictory. Whereas analysis requires the student to take a problem

apart, synthesis requires pulling together a variety of ideas, viewpoints, problems, or concepts and placing them in a single framework. Ideally, a university's comprehensive examination at the masters or doctoral level should focus on the synthesis level, demanding that the student assemble all his various information inputs into one general framework. When you write synthesis objectives you probably will include words such as "categorize," "combine," "pull together," "organize," or "reorganize."

6. Evaluation. To assess means to measure the amount of; to evaluate means to assess-and judge. Evaluation implies all of the preceding levels: having knowledge, comprehending, applying, analyzing, and synthesizing. At the final level the student evaluates or makes a judgment about the concept at hand. Generally, when one judges it is in the context of "compared to"-it is on the basis of some set of criteria. You may, in some situations, provide the framework to the student. At other times his judgments will be made on the basis of criteria which he has established within himself.

In writing behavioral objectives, avoid the error of continually emphasizing the knowledge and comprehension categories to the exclusion of the others-unless, of course, the knowledge and comprehension objectives are legitimately the primary emphasis of your particular area of instruction. This, however, is rarely the case. Most instructional programs will have objectives at nearly all of the cognitive levels.

In addition to the cognitive hierarchical levels, a taxonomy of affective objectives has been developed. The affective includes such things as interests, attitudes, feelings, emotional set, and appreciations. Just as in the cognitive case, the affective area has been divided into categories. Receiving is the first. Before you can have any effect on a student he must be willing to receive your attention. A student who is receiving is listening, or selecting for attention, or is paying attention.

Responding is the second affective level. When a student responds, he goes further than simply paying attention; he responds to or participate in this process. The student might respond because he wants to or he might respond because (he thinks) he has to. After the responding level comes the valuing level. How much does he appreciate a certain concept or idea? What is his attitude toward it?

A person has many values. Sometimes the values come into conflict with each other. A person must do more than just develop values; he must make them internally consistent if a sense of personal stability is to result. The notion of organizing values into an internally consistent system is assumed under the heading of organization, which follows valuing in the affective taxonomy.

The final category is characterization by a value or value complex. First the person develops values; then makes the values internally consistent; under the final category, the person's behavior (his life style) is under the control of this value system. If one's behavior is controlled by a stable and consistent system of values, the behavior tends to be both pervasive and relatively predictable.

The cognitive domain centers on feelings-the students' attitudes, interests, and personality. The final domain is the psychomotor domain. The simplest kind of psychomotor activity involves imitation ("How big is the bay? Sooooo big!"). A student is expected to imitate the teacher's examples in the process of learning to copy letters and numbers. But the student must also learn to write letters, words, and numbers without the teacher providing an example. The student must learn to make physical movements with some precision in activities ranging all the way from handwriting to recreational games or typing. Objectives in the psychomotor domain would include, "writes name legibly." "Prints letters of alphabet," "writes name legibly," "prints letters of alphabet," "writes from left to right," or "is capable of operating an automobile safely."

The goal of this section has been to caution you against specifying only lower level cognitive objectives at the expense of higher level cognitive objectives. Affective and psychomotor objectives should be included when appropriate. The descriptions of the cognitive and affective categories have been necessarily brief, and potential users are urged to consult the primary sources for more detail.

Before going on, though, try your hand at categorizing the following objectives. Number your page 1 through 12 and make two columns-one headed "Type," the other, "Level" for each number. First, decide if the objective is cognitive, affective objectives, also decide in which of the hierarchical categories the objective belongs.

EXAMPLE: The student should recall the names of the continents without error.
TYPE: Cognitive LEVEL: Knowledge

1. The student should be able to categorize and name the parts of an unfamiliar business letter.

2. The student should be able to critique and appraise another student's German composition on the basis of its organization.

3. The student should be able to solve a math problems which requires both addition and subtraction, although he has previously solved problems using only one at a time.

4. The student should demonstrate his interest in the topic presented by the guest speaker by asking questions.

5. The student shall paint a picture that demon-

strates mastery of the principles of shading and perspective.

6. The student should be able to give an example of a mathematical induction proof.

7. The student should be able to carry out a lab experiment involving a new problem which is based on principles already familiar to him.

8. The student will turn in his team project by the date it is due.

9. The student should be able to identify the designated parts of the sewing machine.

10. The student should integrate political, religious, economic, and social concerns into a discussion of modern education.

11. The student shall be able to play a 25-measure musical composition in a major key to the satisfaction of the teacher.

12. The student should show in his lab write-up that he recognizes the need for structure in his physics lab.

Ten out of twelve correct is a satisfactory score. Differences of opinion can exist, and the placement of an objective in two different categories can often be defended. The answers are as follows:

	TYPE	LEVEL
1.	Cognitive	Analysis
2.	Cognitive	Evaluation
3.	Cognitive	Application
4.	Affective	Receiving
5.	Psychomotor	
6.	Cognitive	Comprehension
7.	Cognitive	Application
8.	Affective	Responding
9.	Cognitive	Knowledge
10.	Cognitive	Synthesis
11.	Psychomotor	
12.	Affective	Organization

Frequently the most important objectives are the one which are most difficult to translate into behavioral language. Although the task is difficult it is usually possible to be at least partially successful. Con-

sider, for example, the two examples which follow. One is from a political science class, the other from English literature.

Among the objectives which are important to a particular political science teacher is one dealing with the interpretation of political statements. This teacher believes a student should be able to read current information, interpret it, and make rational judgments about it. The goal is an important one. It is also very general and probably would be interpreted and evaluated in a wide variety of manners by an array of teachers. Here is how the general goal might be translated into behavioral language:

KNOWLEDGE LEVEL: The student should recall the names of five leading political theorists and recognize statements which describe the general philosophical position of each. (Note: The instructor would probably present this information to the student in a printed or lecture format).

COMPREHENSION LEVLL: The student should be able to state the general philosophical position of the five leaders in his own words to the satisfaction of the instructor.

APPLICATION LEVEL: Given new and unfamiliar statements by each of the five theorists the student shall match the statement to the name of the theorist.

SYNTHESIS LEVEL: (a) Given a political editorial from a newspaper, the student should be able to identify the theorist who would be most in agreement, and the theorist who would be in greatest disagreement. (b) The student should be able to compare the five theorists, giving both similarities and differences in their philosophies. (Each of these would be measured by standards agreeable to the experts in the field, who, in this case, probably would be interpreted as the political science faculty at this school).

EVALUATION LEVEL: Given a political editorial from a newspaper, the student shall be able to identify in writing how the statement agrees and disagrees with his own political philosophy, where his own political philosophy is described in terms of the five theorists.

Remember that the general goal was: "A student should be able to read current information, interpret it, and make rational judgments about it." Note how the behavioral statements make the meaning of this general statement unambiguous. Perhaps you do not agree with the interpretation. The fact that you now know how the general statement is going to be specifically interpreted is one of the strengths of doing things in behavioral language. When the statement was left in general terms, you did not have enough information to decide whether or not you were in agreement.

The process of defining levels in the taxonomy is dangerous. For example, under the application heading the objective asks that the student read a new statement by each theorist and identify the theorist from the viewpoint. Now suppose the teacher is disreputable and sneaks the information to the student, or the student is interested enough in the topic to do extensive outside reading. In either case what was supposed to be new information is really familiar to the student. Therefore, the objective is no longer the appli-

cation of a previously learned amount of information, but is a knowledge level objective, since the student would simply be recongizing or recalling something previously learned.

The second example is drawn from a literature class. The class is reading Huckleberry Finn. The teacher has this general goal: That the student understands the basic techniques and thematic implications of Huckleberry Finn. In more specific language, some objectives might be:

KNOWLEDGE: Name and discuss briefly five of the different people Huck pretends to be on various occasions.

COMPREHENSION: Cite four examples of satire that Twain uses in Huckleberry Finn.

APPLICATION: Judging from his behavior, statements, and the rationale he seems to employ, what would you hypothesize to be Huck's concept of God?

ANALYSIS: Including Pap and Jim as specific examples, discuss the concept of the "Father image" and authority as they relate to Huck. Explain the relationship of this with the novel's overall themes.

SYNTHESIS: Pretend that you are Huckleberry Finn and you have been asked to give a speech relating your ideas about hypocrisy in humanity. Write an essay outlining your views.

EVALUATION: In light of contrasting ideas such as the responsibility of man to his society, and the responsibility of the individual to himself, argue for or against the style of life that Huck's philosophy would idealize. Use examples to support your case.

Questions

1. Choose a general goal from arithmetic. Translate it to behavioral terms at various cognitive levels as has been done in the two examples.

2. Here is a very general objective from a college level experiential psychology class: The student shall become sensitive to differences in the individual lifestyles. Try to translate the general objective to behavioral language.

Summary

The goal of a behavioral objective is to make a communication specific and unambiguous. If a statement is specific, nearly everyone using it will have approximately the same interpretation of the meaning. It should tell what the student will be doing when the objective is reached. The verb in the behavioral statement should describe an activity engaged in by the person you are observing.

A behavioral objective will describe the terminal or final behavior of the students. Of course, a whole series of other behaviors may be required before the student can show the terminal behavior. The behavioral statement does not speak to instructional strategy, only to the terminal behavior desired. The statement should not be capriciously imposed. The teacher should have reasons for imposing each of the conditions-why should one formula be memorized when books are allowed in other cases?

The criterion measure indicates to what degree the student has obtained the desired objective. Usually absolute perfection is not required in a task, so most behavioral objectives contain a minimum acceptance level. Once again, the minimum acceptance level must be reasonable and fit the situation. Sometimes perfection should be required; at other times 50 percent accuracy may be good enough.

Behavioral objectives are not limited to the lower level cognitive types of recall and recognition questions. Objectives can be written in behavioral language at all six cognitive levels-knowledge, comprehension, application, analysis, synthesis, and evaluation. Behavioral objectives can also be written in the affective and psychomotor areas.

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